

Original Communication

## More about the developing of invisible lipstick-contaminated lipmarks on human skin: The usefulness of fluorescent dyes

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### Abstract

At the present time fingerprints are one of the simplest, and most reliable means of identification. Increasingly, crime scene investigators look for palm, foot, ear or lip prints. With regard to lip prints, the use, very common today, of protective or permanent lipsticks allow the production an invisible lipmark (or invisible lipstick-contaminated lipmark) which is possible to develop. Some results have already been published about developers useful for different kinds of surfaces (both porous and non-porous) as well as those which are more efficient in case of old or recent prints. The latest studies are about the developing on human skin, and they prove the usefulness of lysochromes (specifically Sudan Black) for the develop of recent invisible lipstick-contaminated lipmarks on corpse skin. This study attempts to determine the efficiency of fluorescent reagents to develop invisible lipstick-contaminated lipmark on human skin. Results show that REDescent Fluorescent Latent Prints Powder is effective for obtaining recent invisible lipstick-contaminated lip mark on the skin of deceased.

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### 1. Introduction

At the present time fingerprints continue being one of the simplest, surest and more reliable means for identification.<sup>1</sup> Furthermore, the possibility of getting a DNA profile from fingerprints double their identification value.<sup>2,3</sup>

Besides fingerprints, investigators are more and more often looking for palm, foot, ear or lip prints.<sup>4</sup> With regard to lip prints, visible ones (that is, those produced by lipstick made-up lips) have been traditionally studied.<sup>5,6</sup> However, the use of protective or permanent lipsticks is very common today and, although this kind of

lipstick do not leave a visible lip print, they produce an invisible one (or invisible lipstick-contaminated lipmark) which is possible to develop.<sup>7</sup>

Due to the fact that the invisible lipstick-contaminated lipmarks have a different chemical composition to fingerprints, it is necessary to look for appropriate reagents for their development. Developers useful for different kinds of surfaces (both porous and non-porous) as well as those which are more efficient in case of old or recent prints have been described.<sup>8–10</sup> The possibility of obtaining DNA profiles from a latent lip print developed with lysochromes has already been proved.<sup>11</sup>

Human skin is a very difficult surface for latent print developing. Several interesting studies about latent fingerprint developing on human skin have been published.<sup>12–14</sup> The usefulness of lysochromes (specifically Sudan Black)

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for developing recent invisible lipstick-contaminated lipmarks on corpse skin has been described.<sup>15</sup>

When working on dark or multicolored surfaces, the latent lip print developing using lysochromes, can present problems of contrast and could be difficult to visualize the lip print. Human skin can be dark, or to have bruises, marks, tattoos and generally the color is not homogeneous. In these cases the fluorescent reagents may be useful to avoid contrast problems.

This study follows this course of investigation and attempts to determine the efficiency of several reagents, specifically fluorescent powder used for fingerprints (REDescent Fluorescent Latent Print Powder) and Nile Red.

## 2. Material and method<sup>15</sup>

The following materials were used:

### 2.1. Materials

- Standard protective lipstick (Protector labial Deliplus1 BCM 35500 VITRE. France).

*Major ingredients:* Pentaerytrityl tetracaprylate, octyl hidroxyterate, bis-diglyceril caprylate, syntetic wax, ozokerite, hydrogenated castor oil, cetearyl isononanoate, benzophenone-3-butyl methoxydibenzolymethane, dicaprylyl maleate, cera microcrystallina, octyl methoxycinnamate, titanium dioxide, octyldodecanol, propylparaben, BHA, alumina, silica, BHT.

- Brushes.
- Mould to make the lipprint in the skin: a mould which reproduces the shape and the outline (as well as the lips lines and wrinkles) has been used to make the lipprint on corpses' skin.
- Ultraviolet light that works between 320 and 400 nm.
- Spectacles for Forensic-Light personal protection (Sirchie).

As obtaining DNA profiles from the developed print is a subsequent aim, it is advised that new powders and sterilized brushes are used to prevent cross-contamination.

### 2.2. Reagents

- REDescent Fluorescent Latent Prints Powder (Sirchie Finger Print Laboratories, INC. Catalog number LL701).  
*Chemical composition:* Lycopodium (33%), Rocket red AX pigment (66%).<sup>16</sup>
- Nile Red (Aldrich).

### 2.3. Method

#### 2.3.1. Sample preparation (following the method described in reference<sup>15</sup>)

The protective lipstick is spread on the mould between and 2 and 3 min are allowed to elapse for fixing.

The mould is then pressed on the corpse skin to obtain an invisible lipmark. The bodies of 40 individuals deceased of natural or violent causes and the areas selected to form the print were the right side of the neck and the anterior region of the forearm.

It is recommended,<sup>17</sup> to wait until the corpse skin is completely dry before developing the print.

The date and cause of death were variable.

#### 2.3.2. Reagent preparation

Reagents have been used in powdered form, without any additional preparation.

#### 2.3.3. Processing procedure

For the examination of the deceased, the following sequence has been applied:

- (a) Previous search using UV light.
- (b) Development with powder fluorescent reagents (REDescent Fluorescent Latent Prints Powder and Nile Red): using a brush, a very small quantity of reagent is spread on the surface where the mark was formed.
- (c) Examination using UV light.

Following the latent lip print preparation, the process of development begins (a time interval of 15 min has passed since the lip print has been made).

## 3. Results

- (a) Previous examination using UV light: With UV light invisible lipmarks can be located. Areas where the reagent must be applied to latent print developing, can be delineated.
- (b) Development with fluorescent reagents (REDescent Fluorescent Latent Prints Powder and Nile Red) and examination using UV light (and protective spectacles):



Fig. 1. Invisible lipstick-contaminated lip mark after developing using REDescent Fluorescent Latent Prints Powder.

If the development is positive, the shape and the lips outline can be seen and also some lip lines and wrinkles.

We have obtained a positive development for all of the lipmarks prints developed using REDescent Fluorescent Latent Prints Powder but the developing was obtained only in three cases with Nile Red.

Fig. 1 shows an invisible lipstick-contaminated lip mark after developing using REDescent Fluorescent Latent Prints Powder.

#### 4. Discussion

From the results the following can be deduced.

The bibliography shows that Nile Red is much more efficient than Fluorescent Latent Prints Powder for developing invisible lipstick-contaminated lipmarks on porous surfaces, such as paper tissues, colored paper napkins and colored cotton and satin cloths.<sup>9</sup> On human skin nonetheless, the opposite is the case. Nile Red is poorly effective, as Fluorescent Latent Prints Powder make possible the developing in all of the cases.

It is needed to point out that the results of the work are related to the reagents' effectiveness on recent invisible lipmarks. The study of old lipmarks is planned in the near future.

#### 5. Conclusion

Under the described experimental conditions, the REDescent Fluorescent Latent Prints Powder is effective for obtaining recent invisible lipstick-contaminated lip mark on corpse skin. The possibility of using this reagent on latent lip prints produced without lipsticks ("normal" lipmarks) should be studied.

Although Nile red is very effective for developing on other surfaces, is not useful for this surface.

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